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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Bowman et al.	
Application No.: 09/869,365	
Filed: 9/25/2001	Group Art Unit: 2879
Title: Gas Discharge Tube	Examiner: Karabi Guharay
Attorney Docket No.: GOTE.P-044	

Transmittal of Appeal Brief

Enclosed herewith are the following papers in support of the Appeal filed July 12, 2005 in the above-referenced application:

1. Brief for Appellant

2. Credit Card Charge Form.

The Commissioner is authorized to charge any additional fees due or credit any overpayment to Deposit Account No. 15-0610.

Respectfully submitted,

Marina T Larson

Marina T. Larson Ph.D.
PTO Reg. No. 32,038
Attorney for Applicant
(970) 468-6600

I hereby certify that this paper and any attachments named herein are transmitted to the United States Patent and Trademark Office, Fax number: 571-273-8300 on September 5, 2005.

Marina T Larson

Marina T. Larson, PTO Reg. No. 32,038

September 5, 2005
Date of Signature

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BRIEF FOR APPELLANT

This brief is filed in support of Applicants' Appeal from the rejection mailed 3/8/2005. The claims have been twice rejected. Consideration of the application and reversal of the rejections are respectfully urged.

Real Party in Interest

The real party in interest is Jensen Devices AB.

Related Appeals and Interferences

To Applicant's knowledge, there are no related Appeals or Interferences.

Status of Claims

Claims 18-36 are rejected, and are the subject of this Appeal. Claims 1-17 and 37 have been canceled. No other claims have been presented.

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Status of Amendments

No amendments have been made subsequent to the close of prosecution. All prior amendments have been entered.

Summary of Claimed Subject Matter

The present invention relates to a gas discharge tube of the type used as surge arrestors for the protection of electronic equipment and as switches. (Page 1). The gas discharge tube of the invention has at least two electrodes, and a hollow insulator that is fastened to at least one of the electrodes. Page 4, lines 16-20, Fig. 1). The invention differs from prior gas discharge tubes in the coating which is applied to the electrodes. This layer prevents the build-up of layers such as oxide or hydroxide layers on the electrode surface, and results in gas discharge tubes with better characteristics. (Page 3, line 24-Page 4, line 7).

As set forth in independent claims 18 and 28, the coating applied in the present invention is one formed by physical or chemical vapor deposition or chemical vapor deposition. These processes are described in the application on Page 5, line 24-Page 6, line 9. Specific coatings that are desirable are gold, titanium, platinum, carbon coatings, for example graphite, and mixtures of carbon with metals such as chromium or titanium. (Page 5, lines 7-15, Page 6, line 13).

Grounds of Rejection to be reviewed on Appeal

Claims 18-36 stand rejected under 35 USC § 103 as obvious over the combination of Haas (US Patent No. 4,407,849) in view of Lemelson (US Patent 5,349,265). This rejection is to be reviewed on Appeal, and Applicant submits that two issues are presented.:

(1) whether the Examiner has established a *prima facie* case of obviousness; and

(2) if so, whether this is overcome by the declaration submitted in response to a previous rejection, which does not appear to have been considered in the presentation of the currently outstanding rejection.

Argument

I. There Is No Motivation to Combine Haas And Lemelson and Thus No Prima Facie Case of Obviousness

In order to rely on a combination of references as a basis for a *prima facie* case of obviousness, there must be a suggestion to make the combination. "Citing references which merely indicate the isolated elements ... are known is not a sufficient basis for concluding that the combination of elements would have been obvious." *Ex Parte Hiyamizu*, 10 USPQ 2d 1393, 1394 (POBAI 1988). Finding the isolated elements, however, is all that has been done in this case.

Haas discloses a surge arrestor, i.e., a gas discharge tube, in which the electrodes are coated with carbon. In the Haas patent, the carbon coating is formed by spraying colloidal graphite (a suspension of graphite in alcohol and water) to give a coating, and then subjecting the electrodes to a rapid sequences of current spikes to improve adhesion. Such current spiking (or the first application of an electrical discharge following this type of deposition in the course of use) will result in spreading of carbon inside the electrode housing, which leads to undesirable characteristics, namely uneven discharge voltage and current distributions. Haas does not teach formation of carbon coating by physical or chemical vapor deposition. Coatings deposited in this manner result in superior products, however, as has been demonstrated via the declaration attached as an exhibit.

The Lemelson patent is cited by the Examiner for a teaching of the use of chemical vapor deposition to apply a carbon (diamond) coating to an electrode. Lemelson, however, does not relate to a surge arrestor or any other type of gas discharge tube. Rather, it relates to "electrodes such as filaments in electric lamps" that are subject to heat corrosion and/or erosion or evaporation during use. (Lemelson, Abstract, Column 1, lines 10-17). An exemplary embodiment of the Lemelson invention is a spark plug (Fig. 1). In the spark plug depicted in Fig. 1 of Lemelson, the diamond coating is applied to some, but not all of the electrode surface, and the spark or arc discharge between the electrodes occurs between the areas not covered.

(Lemelson, Col. 2, lines 51-63, Col. 3, lines 3-28). The Examiner relies on the teaching of CVD formation of a diamond layer in Lemelson to modify Haas, to use a CVD deposition method in making a surge arrestor.

There is no connection between the spark plug of Lemelson and the surge arrestor of Haas, and the Examiner does not assert that one exists. Indeed, his rationale for making the combination is not based on the references but an overly generalized statement that "it has been held to be within the general skill of a worker in the art to select a known method on the basis of its suitability for the intended use." The Examiner has not, however, shown that anything about Lemelson teaches that CVD is suitable for the intended use of a surge arrestor which is the use in Haas.

In this regard, it is noted that the purpose of the Lemelson devices is to pass sparks, and to do so with efficiency. In contrast, the purpose of a surge arrestor is to not pass a spark until an excess of voltage occurs, and then to discharge the excess voltage to ground so as to protect equipment. The Examiner has offered no reasoning as to why material suitable for the one purpose would be suited to the other. Accordingly, the rejection is nothing more than a statement that carbon can be deposited by CVD, and that using any known method, including CVD, in making the Haas device would have been obvious. This is the same rejection previously made by the Examiner and withdrawn following argument and the submission of a declaration.

Furthermore, Haas teaches a scheme for bonding the carbon to the electrode using many voltage pulses. Nothing in Lemelson suggests that CVD of diamond would meet this need of electrode bonding, especially since Lemelson shows that a break in the coating is made for the spark to occur in. (Lemelson, Col. 2, lines 51-63, Col. 4, lines 3-28).

It should further be noted that the Examiner has not established that corrosion which is the problem addressed in Lemelson is a problem in surge arrestors. The Lemelson spark plug electrodes are not in a sealed environment, and thus can be seen to present different problems than a gas discharge tube. The Lemelson light bulb embodiments may be in a sealed environment, but their use involves the continuous passage of current, and the heating of the

filament. This is not the manner in which a surge arrestor operates, and accordingly, one cannot properly extrapolate to say that corrosion would be a recognized problem in surge arrestors.

For these reasons, Applicants submit that the Examiner has failed to present a prima facie case of obviousness. The rejection of claims 18-36 should therefore be reversed.

II. The Declaration Overcomes any Prima Facie Obviousness

In an earlier rejection in this case, the Examiner argued that depositing a coating of carbon produced the same product, no matter what method was employed. Applicants submitted a declaration (attached in Exhibit Appendix) that showed that this was not true. The Examiner has presented the new rejection now on Appeal without commenting on this declaration. It is, however, part of the record and must be considered. This evidence is sufficient to establish the non-obviousness of the claimed invention, even if a prima facie case is deemed to be presented.

As pointed out in the declaration, the method of deposition of the carbon layer makes a significant difference in the performance of the gas discharge tube. This is directly contrary to the previously expressed, and now implied assertion of the Examiner that the manner of deposition makes no difference. Nothing in the art suggests that layers deposited using chemical or physical vapor deposition would result in superior properties for a gas discharge tube, and this is therefore an unexpected benefit that confers patentability. Thus, the rejection of claims 18-36 should be reversed.

III. Various dependent Claims Are Non-Obvious for Additional Reasons

(a) Claims 21, 26, and 34 specify deposition of the layer by sputtering

Claims 21, 26, and 34 specify deposition of the layer by sputtering. As noted on page 5, lines 26 of the present application, sputtering is a physical deposition process. Lemelson does not disclose sputtering as a deposition technique. Thus, as to this element, the combination of references do not disclose the claimed subject matter, and a prima facie case of obviousness is not established.

It is noted that on page 4 of the Official Action that the Examiner asserts that Lemelson teaches sputtering at Col. 6, lines 52-56. This section, however, teaches chemical vapor deposition, which is not the same thing as sputtering.

(b) Claims 22, 23, 25, 30, and 31 recite a combination of carbon and a metal.

Claims 22, 23, 25, 30, and 31 recite a combination of carbon and a metal. The Examiner states that this limitation is met because Lemelson discloses a further metallic coating over the diamond coating. The Examiner has not addressed how the separate layers disclosed in Lemelson meet the limitation of a coating material that is a combination of graphite and a metal. The specification describes combinations of carbon and metal in the context of a mixture formed in a common deposition step (for example by deposition of carbon from a methane atmosphere using chromium electrodes, as described on Page 7). The claims refer to a coating material that is deposited in physical or chemical vapor deposition, and it is this coating material that is the combination. Further, the specification teaches that the metal "locks" the sublayers of a graphite layer together (page 7, lines 15-16), something that could not occur through a mere overcoat. Thus, the reference fails to teach the limitation in these claims and no *prima facie* case of obviousness has been established.

(c) Claims 25, and 33 require the combination of graphite and a metal

Claims 25 and 33 contain the recitation that the coating material is a combination of graphite and a metal. The Examiner states that these claims are obvious because Lemelson discloses a layer of metal disposed over the diamond coating. However, diamond and graphite are not the same. Thus, as a first matter, this rejection is defective because the Examiner has presented no reasons why the person skilled in the art would selected, from the myriad combinations and possibilities, to use the deposition technique of Lemelson in combination with the graphite material of Haas, and then use an overcoating of a metal in a gas discharge tube. This is particularly so since nothing in the cited art establishes any similarity in requirements between a gas discharge tube and a spark plug or light bulb. Indeed, the reason for the

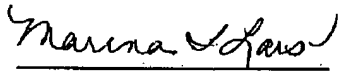
overcoating on the diamond is noted in Lemelson to be "to protect the diamond films applied to the described electrodes and filaments from degrading effects which may occur during electrical energization and heating of the core elements thereof." (Col. 5, line 54-57). Such heating occurs through repeated/prolonged passage of sparks or current, however, and not as a result of the hopefully rare reliance on and passage of a spark through a surge arrestor as in Haas.

Furthermore, as discussed above in section III (b), the Examiner has not addressed how the separate layers disclosed in Lemelson meet the limitation of a coating material that is a combination of graphite and a metal. Thus, no *prima facie* case has been established with respect to claims 25 and 33 for this additional reason.

Conclusion

For the foregoing reasons, Applicants submit that the rejection of claims 18-36 are in error and should be reversed.

Respectfully submitted,



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Claims Appendix

18. Gas discharge tube comprising at least two electrodes and at least one hollow insulator fastened to at least one of the electrodes, wherein said at least two electrodes have a chemically inert surface, and wherein the chemically inert surface has been applied to the electrodes using a physical vapour deposition or a chemical vapour deposition of coating material.

19. Gas discharge tube according to claim 18, wherein the coating material is selected from the group of carbon, gold, and platinum.

20. Gas discharge tube according to claim 19, wherein the coating material is carbon and said carbon is present as a polymorph of carbon.

21. Gas discharge tube according to claim 20, wherein the carbon has been applied using sputtering.

22. Gas discharge tube according to claim 20, wherein the carbon is applied in combination with a metal.

23. Gas discharge tube according to claim 22, wherein the metal is chromium or titanium.

24. Gas discharge tube according to claim 18, wherein the coating material is carbon and said carbon is present as a polymorph of carbon.

25. Gas discharge tube according to claim 24, wherein the carbon is present as graphite in combination with a metal.

26. Gas discharge tube according to claim 24, wherein the carbon has been applied using sputtering.

27. Gas discharge tube according to claim 24, wherein the carbon is present in a layer having a thickness of 1 μm.

28. Method for the manufacture of gas discharge tubes comprising at least two electrodes, and at least one hollow insulator fastened to the electrodes, wherein said at least two electrodes have a chemically inert surface, said method comprising the step of applying a coating material to form the chemically inert surface onto the electrodes using a physical vapour deposition or a chemical vapour deposition process.

29. Method according to claim 28, wherein the coating material is selected from the group of carbon, gold, and platinum.

30. Method according to claim 29, wherein the coating material is carbon in combination with a metal.

31. Method according to claim 30, wherein the metal is chromium or titanium.

32. Method according to claim 29, wherein the coating material is carbon, and said carbon is present as polymorph of carbon.

33. Method according to claim 32, wherein the carbon is present as graphite in combination with a metal.

34. Method according to claim 29, wherein the carbon has been applied using sputtering.

35. Method according to claim 29, wherein the deposition of carbon takes place in an atmosphere of methane.

36. Method according to claim 29, wherein the carbon is present in a layer having a thickness of 1μm.

Evidence Appendix

Declaration

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Attorney Docket No.: GOTE.P-044	Confirmation No: 3983
Customer No.: 021121	

DECLARATION UNDER 37 CFR § 1.132

The undersigned hereby declares as follows:

1. We are named inventors of the above-referenced application, and we are familiar with the application, including the claims thereof.

2. We understand that an Official Action has issued in this case in which the Examiner takes the position that the method of making the chemically inert surface is not germane to issues of patentability of claims to gas discharge tubes. We further understand that the method of making the chemically inert surface would be relevant if this method results in a different product from the method described in the cited prior art, as US Patent No. 4,407,849.

3. Tests have been conducted to demonstrate the differences between a chemically inert layer being applied to the electrodes of the gas discharge tune using a physical vapour deposition or chemical vapour deposition made in accordance with the process language in the claims of this application, and one made by the method of the prior art.

A number of surge arrester tubes of the prior art were prepared, as well as a number of tubes according to the present invention.

The carbon attached according to the prior art is attached to cover any surface unevenesses and metal grain boundaries. The carbon is attached mechanically, such as if added by way of a pencil, called Carbon in the following Table.

The carbon attached in the tubes of the present invention was attached using physical vapour deposition, called PVD in the following Table.

The tubes were all identical in all other respects.

The tubes were then tested to meet the specification according to International Telecommunication Union Standardization ITU:K12, which is a standard for surge arrester tubes. Thereby the tubes are tested
for destroying testing meeting

a. in a first test 5 ampere (A) 10 times for 1 second, whereby the current is a normal AC-current, 5 tubes of the respective manufacturing process;
b. in a second test 5 kA in a pulse wave raising during 8 µs and descending during 20 µs, a so called 8/20 pulse, 10 times5 tubes of the respective manufacturing process;
c. in a third test 2 x 100 A in a pulse raising during 10 µs and descending during 700 µs, 10/700 pulse, 500 times, 5 tubes of the respective manufacturing process. The tubes have three poles and to two of the poles 100 A are added, thereby stating 2 x 100 A;
d. in a fourth test by discharging a capacitor at ignition voltage, so called unloaded condition, where only some milliamperes passes the tubes, 5 tubes of the respective manufacturing process.

Then all tubes, in total 40 tubes, 20 of each manufacturing process are placed in a test frame where they are made subject to ignition voltages:

1. to provide a first breakdown value (or first ignition value) in darkness to avoid any photon influence, called Utla in the Table to follow;
2. to provide a following ignition value, called Utlb in the Table to follow;
3. to provide a corona voltage (a mere delivery testing), called Ugl in the Table to follow;

whereby the tubes having a nominal voltage of 230 volts, shall stand at least 180 volts for Utla and Utlb, and a maximum voltage of 300 volts. The voltage inclined approach applied is 1 kV/s. The results of the tests are shown in the following Table.

Table
Tubes 1-20 are manufactured according to prior art, US Patent No. 4,407,849, and tubes 21-40 are manufactured according to the present invention

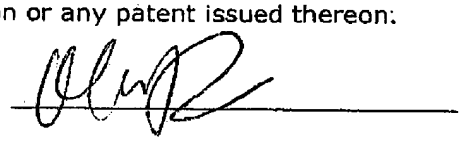
Tube	Utla	Utlb	Ugl	Type	Load	Result
1	402	319	245	Carbon	5A	Not ok
2	356	344	243	Carbon	5A	Not ok
3	360	321	211	Carbon	5A	Not ok
4	349	357	237	Carbon	5A	Not ok
5	286	252	266	Carbon	5A	Ok
6	389	338	233	Carbon	5kA	Not ok
7	325	288	247	Carbon	5kA	Not ok
8	369	360	237	Carbon	5kA	Not ok
9	317	280	243	Carbon	5kA	Not ok
10	397	388	247	Carbon	5kA	Not ok
11	361	275	221	Carbon	100A	Not ok
12	323	322	214	Carbon	100A	Not ok
13	349	330	213	Carbon	100A	Not ok
14	349	322	219	Carbon	100A	Not ok
15	331	292	227	Carbon	100A	Not ok
16	313	276	258	Carbon	Unloaded	Not ok
17	337	328	217	Carbon	Unloaded	Not ok
18	412	350	243	Carbon	Unloaded	Not ok
19	281	292	246	Carbon	Unloaded	Ok
20	333	316	212	Carbon	Unloaded	Not ok
21	270	226	201	PVD	5A	Ok
22	222	211	200	PVD	5A	Ok
23	250	221	179	PVD	5A	Ok
24	242	205	191	PVD	5A	Ok
25	210	199	184	PVD	5A	Ok
26	279	219	180	PVD	5kA	Ok
27	222	217	204	PVD	5kA	Ok
28	279	201	194	PVD	5kA	Ok
29	223	217	177	PVD	5kA	Ok
30	212	195	184	PVD	5kA	Ok
31	210	195	196	PVD	100A	Ok
32	222	197	178	PVD	100A	Ok
33	231	201	180	PVD	100A	Ok
34	269	211	196	PVD	100A	Ok
35	218	205	187	PVD	100A	Ok
36	227	206	189	PVD	Unloaded	Ok
37	220	207	180	PVD	Unloaded	Ok

38	287	226	197	PVD	Unloaded	Ok
39	302	215	188	PVD	Unloaded	Not ok*
40	223	223	195	PVD	Unloaded	Ok

* The voltage Utla is only 2 volts above maximum. The ITU:K12 allows a small percentage deviation.

As evident from the Table above one of the prior art tubes passed the 5 ampere (A) 10 times for 1 second, normal AC-current, and one of the prior art tubes passed the unloaded testing (discharging of capacitor), while one tube of the present invention did not pass the test specification, but only marginally. Since the only difference between the prior art tubes and the tubes of the invention is the manner in which the carbon was deposited, it is concluded that the manner of deposition makes a structural difference which is significant to performance of the tube.

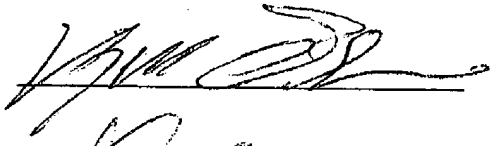
We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

dated: 

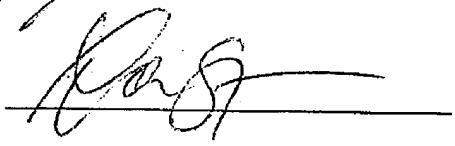
Mats Boman

dated: 

Jan-Åke Nilsson

dated: 

Kjell Öhman

dated: 

Johan Schleimann-Jensen

Related Proceedings Appendix

None